

What is claimed is;

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1. A matrix panel display apparatus having plural signal lines and plural scanning lines intersecting each other and, near each intersection point, a picture element including a picture element electrode, a counter electrode, a display medium between said two electrodes and a transistor for applying image signals from said signal line to said picture element electrode controlled based on said scanning signals from said scanning line, which said apparatus comprises;

means for generating auxiliary signals for increasing the effective voltages of said image signals and applying said auxiliary signals to said picture elements while each 15 of said transistor is non-conducting and each of said picture element is not selected.

2. A matrix panel display apparatus having plural signal lines and plural scanning lines intersecting each other and, near each intersection point, a picture element including a picture element electrode, a counter electrode, a display medium between said two electrodes and a transistor for applying image signals from said signal line to said picture element electrode controlled based on said scanning signals from said scanning line, which said 25 apparatus comprises;

means for generating auxiliary signals for increasing the effective voltages of said image signals and applying

said auxiliary signals to said picture element electrodes while each of said transistors is non-conducting and each of said picture elements is not selected.

5 3. A matrix panel display apparatus having plural signal lines and plural scanning lines intersecting each other and, near each intersection point, a picture element including a picture element electrode, a counter electrode, a display medium between said two electrodes and a 10 transistor for applying image signals from said signal line to said picture element electrode controlled based on said scanning signals from said scanning lines, which said apparatus comprises;

means for generating auxiliary signals for increasing 15 the effective voltages of said image signals and applying said auxiliary signals to said counter electrodes while each of said transistors is non-conducting and each of said picture elements is not selected.

20 4. A matrix panel display apparatus according to claim 1, 2 or 3, wherein said means for generating said auxiliary ~~operates in response to signals generates said auxiliary signals based on~~ information from a system circuit which originally generates image signals.

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5. A matrix panel display apparatus according to claim 1, 2 or 3, wherein said means for generating auxiliary signals is provided in a scanning circuit for applying said

scanning signals to said scanning lines.

A 6. A matrix panel display apparatus according to claim 1,
2 or 3, wherein said auxiliary signals are applied ~~in the~~
A 5 predetermined period while all ~~said~~ picture elements are in
non-selected state.

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D2* 7. A matrix panel display apparatus according to claim 1,
2 or 3, wherein waveforms and amplitudes of said auxiliary
10 signals are variable.

8. A matrix panel display apparatus according to claim 1,
2 or 3, wherein said auxiliary signals are independent of
said image signals.

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A 9. A matrix panel display apparatus according to claim 1,
2 or 3, wherein said display medium is λ liquid crystal.

10. A matrix panel display apparatus according to claim 1,
20 2 or 3, wherein the time average of said auxiliary signal
nearly equals zero.

11. A matrix panel display apparatus according to claim 1,
2 or 3, wherein said means for generating said auxiliary
25 signals comprises an auxiliary signal generating circuit
for generating said auxiliary signals and auxiliary signal
information generation means for inputting information to
determine waveforms of said auxiliary signals into said

means for generating said auxiliary signals.

12. A matrix panel display apparatus according to claim 1,
2 or 3, wherein said auxiliary signal information
5 generation means is an apparatus using variable
resistances.

13. A matrix panel display apparatus according to claim 1,
2 or 3, wherein said transistors are Thin Film Transistors
10 (TFT).

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14. A matrix panel display apparatus according to claim 1,
2 or 3, which said apparatus comprises;
15 a signal circuit for applying said image signals to
said signal lines, and
a scanning circuit for applying said scanning signal
to said scanning lines, having a first signal generation
means for turning said transistors to conducting state and
selecting said picture elements thereby and a second
20 generation means for continually applying said auxiliary
signals.

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15. A method for driving a matrix display apparatus which
selects plural picture elements arranged in matrix state in
25 turn and inputs signals including image information into
said selected picture elements, said method comprises the
step of
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A applying first signals depending on said image

information and second signals including auxiliary signals for increasing the effective voltages of said first signals, which are inputted during the non-selected state of said picture elements, to said picture elements.

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16. A method for driving a matrix display apparatus which selects plural picture elements arranged in matrix state in turn and inputs signals including image information into said selected picture elements, said method comprises the

10 step of;

applying first signals depending on said image information and second signals including auxiliary signals, independent of said image information, for increasing the effective voltages of said first signals which are inputted to said picture elements during the non-selected state of said picture elements.

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20 17. A matrix panel display apparatus having plural signal lines and plural scanning lines intersecting each other and, near each intersection point, a picture element including a picture element electrode, a counter electrode, a display medium between said two electrodes and a transistor for applying image signals from said signal line to said picture element electrode controlled based on said scanning signals from said scanning line, which said apparatus comprises;

25 each of storage capacitances connected to each of said picture elements,

picture signal generating means in a signal circuit for dividing said plural picture elements selected at the same time into two groups and for applying a first picture signal group to said first group of picture elements and a 5 second picture signal group having the polarity reverse to the former signal group to said second group of picture elements, and

bias signal generating means for applying a first bias signal group having the polarity reverse to said first 10 picture signal group to said first group of picture elements through storage capacitances in said first group of picture elements and for applying a second bias signal group having the polarity reverse to said second picture signal group to said second group of picture elements 15 through storage capacitances in said second group of picture elements, during selection period of said first and second group of picture elements.

18. A matrix panel display apparatus according to claim

A 20 17, wherein said display medium is liquid crystal.

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19. A matrix panel display apparatus according to claim 17

or 18, wherein an image signal generating circuit as said

image signal generating means generates said first image

25 signal group and said second image signal group in each of which the polarity of said image signals are turned over in every frame.

20. A matrix panel display apparatus according to claim 17 or 18, wherein the number of said first group of picture elements nearly equals the number of said second group of picture elements.

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21. A matrix panel display apparatus according to claim 17 or 18, wherein each picture element group consisting of the picture elements of every n column elements ($n \geq 1$) is alternately assigned to said first group of picture elements and said second group of picture elements, respectively.

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22. A matrix panel display apparatus according to claim 17 or 18, wherein;

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a control terminal of each transistor is connected to a scanning line, a main terminal thereof to a signal line and the other main terminal thereof to one of the terminals of said picture element electrode and said storage capacitance, and

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two groups of said bias signals, having the polarity reverse to each of said two image signal groups, are applied to said storage capacitances in each of said picture element groups, respectively.

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23. A matrix panel display apparatus according to claim 22, wherein said bias signal generating circuit is included by a scanning signal generating circuit for applying a scanning voltage to said picture elements through said

scanning lines.

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24. A matrix panel display apparatus according to claim 17

or 18, wherein;

5 a terminal of said storage capacitance belonging to
said first group of picture elements is connected to said
scanning line of one line before the line scanned
presently,

10 a terminal of said storage capacitance belonging to
said second group of picture elements is connected to said
scanning line of one line behind one line of the line
scanned presently,

15 said bias signal generating circuit generates said
first bias signal applied to said scanning line of one line
before the line scanned presently and said second bias
signal of the polarity reverse to said first bias signal
applied to said scanning line of one line behind the line
scanned presently while one scanning line is selected, and

20 said image signal generating circuit applies said
image signals having the polarity reverse to said first
bias signal to said first group of picture elements and
said image signals having the polarity reverse to said
second bias signal to said second group of picture
elements.

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25. A matrix panel display apparatus according to claim
24, wherein each picture element group consisting of ~~the~~
picture elements of every n column elements ($n \geq 1$) is

alternately assigned to said first group of picture elements and said second group of picture elements, respectively.

5 26. A matrix panel display apparatus according to claim 24, wherein said scanning signal generating circuit generates bias voltages so as, when a scanning pulse is applied to said scanning line, each polarity of said first bias signal and said second bias signal applied to said 10 scanning line is constant independently of said scanned line in one frame period.

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27. A matrix panel display apparatus according to claim 24, wherein;

15 said scanning signal generating circuit generates bias voltages, when a scanning pulse is applied to said scanning line, so as each polarity of said first bias signal group and said second bias signal group applied to said scanning line is alternately turned over as said scanning pulse 20 transfers in turn on said scanning lines, and said image signal generating circuit generates image signals so as each polarity of said first image signal and said second image signal is alternately turned over in every scanning period as said scanning pulse transfers in 25 turn on said scanning lines.

28. A matrix panel display apparatus according to claim 24, wherein said image signal generating circuit comprises

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a first image signal generating part for applying ~~said~~
image signals to ~~said~~ first group of picture elements and a
second image signal generating part for applying ~~said~~ image
signals to ~~said~~ second group of picture elements.

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29. A matrix panel display apparatus according to claim
24, wherein said image signal generating circuit comprises
a first latch for memorizing said image signals in turn, a
second latch for memorizing said image signals
10 synchronizing to a horizontal synchronizing signal, a third
latch capable of selecting either latching said image
signals or passing through said image signals and a sample
hold circuit for generating said image signals.

15 30. A matrix panel display apparatus according to claim
24, wherein said scanning circuit executes the interlaced
scanning.

20 31. A matrix panel display apparatus according to claim
24, wherein each electrode of said first group of picture
elements partially overlaps with each electrode of said
second group of picture elements in the column direction.

25 32. A matrix panel display apparatus according to claim
24, wherein said first group of picture elements consists
of odd column picture elements and said second group of
picture elements consists of even column picture elements.

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33. A computer system comprises ¹⁷⁹ a matrix panel display apparatus according to claim 24.

34. A method for driving a matrix panel display apparatus having plural signal lines and plural scanning lines intersecting each other and, near each intersection point, a picture element including a picture element electrode, a counter electrode, a display medium between said two electrodes and a transistor for applying image signals from said signal line to said picture element electrode controlled based on said scanning signals from said scanning line,

said method comprises the steps of;

dividing said plural picture elements selected at the same time into two groups,

applying a first picture signal group to said first group of picture elements and a second picture signal group having the polarity reverse to the former signal group to said second group of picture elements, and

applying a first bias signal group having the polarity reverse to said first picture signal group to said first group of picture elements through storage capacitances in said first group of picture elements, and a second bias signal group having the polarity reverse to said second picture signal group to said second group of picture elements through storage capacitances in said second group of picture elements during selection period of said first and second group of picture elements.